Chapter 3.3 WATER QUALITY ASSESSMENT SUMMARY

Statewide summaries of the river miles, estuarine square miles, and coastal linear miles within and bordering Virginia that fully support, partially support, or do not support the overall designated uses for each waterbody are presented in Tables 3.3-2, 3.3-3, 3.3-4 and 3.3-5. Support of the overall uses for each waterbody was determined by examining the support of the five uses. (i.e., aquatic life, fish consumption, shellfishing, swimming, and drinking water).

As in previous 305(b) reports, conventional pollutant data continued to make up the bulk of water quality assessments. Samples for conventional pollutants were collected at DEQ's ambient monitoring stations, along with quality assured monitoring data from other federal, state and citizen monitoring programs, and compared to Virginia's water quality standards. Unlike previous assessments, DEQ used the absolute percentage procedure, as required by EPA, as well as the binomial methods to determine the degree of use support. The assessments are objective except where professional judgement indicates that natural causes are responsible for the violations (or the data are suspect). Waters not meeting standards due to natural conditions are listed as impaired but will not be included in the TMDL development list. For Dissolved Oxygen (DO), the instantaneous minimum standard was used to assess exceedences. Similarly, the maximum fecal coilform standard was used unless a special study was conducted to determine the geometric mean for comparison to the geometric mean standard.

Table 3.3-1 Virginia Water Quality Standards for Dissolved Oxygen, pH, and Maximum Temperature (VR-680-21-01.5)

Class of Waters	Description	Dissolved Oxygen (mg/l)		pH(su)	Maximum Temperature (CE)
		Min.	Daily Avg.		
I	Open Ocean	5.0	--	6.0-9.0	--
II	Estuarine Waters	4.0	5.0	6.0-9.0	--
III	Non-Tidal Waters	4.0	5.0	6.0-9.0	32
IV	Mountainous Zone Waters	4.0	5.0	6.0-9.0	31
V	Put & Take Trout Waters	5.0	6.0	6.0-9.0	21
VI	Natural Trout Waters	6.0	7.0	6.0-9.0	20

Table 3.3-2 provides a summary of all waters assessed (monitored and evaluated). Assessment of Virginia's rivers and streams was calculated to be approximately 49,460.23 miles. At first glance, this appears to be a major increase from the previous reporting period. However, this apparent increase is due to the use of the new federal Assessment Database (ADB) which requires specific segmentation of all waters within a watershed. This new segmentation allows evaluated miles to be considered separate from monitored miles. For instance, fish consumption designated use is evaluated fully supporting for all waters within the state unless there is a VDH advisory based on fish tissue monitoring and/or an exceedence of a fish tissue screening value also based on fish tissue monitoring. In past reports, the federal database allowed only one designation of monitored or evaluated for the whole watershed. Therefore, where only part of a watershed was actually monitored, the whole watershed would, by default, be considered monitored due to the fact that evaluated waters could not be segmented from monitored waters. This was true for DCR high priority waters that are evaluated, but in most cases, had ambient monitoring within each of the high priority watersheds. Using the new and improved database, the actual monitored segments are now considered monitored and any other evaluated data within the watershed is considered evaluated, creating a monitored segment as well as an evaluated segment all within the same watershed. Additionally, further geographical re-indexing and use of the RF3 national hydrologic database has slightly increased the actual number of stream miles within the state. The stream mile delineation guidance has provided consistent guidelines for associating the mileage assessed relative to a specific sampling station. This is especially important where there are no easily identifiable changes in watershed characteristics. In some cases, the stream miles associated with a sampling station have been conservatively reduced from previous assessment reports. As a result of these refinements and the segmentation of evaluated and monitored waters, the total

miles monitored appear to have been reduced while the evaluated miles have greatly increased. The stream mile delineations found in this report are only reflective of the 2000 assessment period. In other words, the delineation tracking and reporting method has changed since the 1998 report and the monitored mileages found in this report only reflect this current report cycle and should not be compared to the monitored mileages in previous reports.

Assessment of estuarine waters covered approximately 2,493.63 square miles of tidal estuaries. Coverage of coastal shore miles remained at 120 linear shore miles. An increased effort to assess the 104 most significant public lakes was accomplished. A total of 139,323.50 acres were assessed. Table 3.3-3 summarizes the assessments of Virginia's waters for support of aquatic life, fish consumption, shellfish, swimming and drinking water goals. Table 3.3-4 lists the causes for waters resulting in less than full support of the Clean Water Act goals and state Water Quality Standards. All coastal shore waters were evaluated to be fully supporting the fishable and swimmable goals. Therefore, no causes of less than full support have been identified for these waters.

A “major impact” of causes and sources is defined as that which causes a significant impairment to the waterbody. Normally, a major impact would be from a sole source or a large contributor and would cause the waters to be not supporting. Moderate and minor impacts have a slight to moderate effect on the waters and may be from a single moderate contributor or a combination of several minor contributors and would generally cause the waters to be considered partially supporting.

As previously stated, the causes and sources of non-support of Virginia's waters, resulting in less than full support of Clean Water Act goals, are summarized in Tables 3.3-4 and 3.3-5. It is apparent, urban runoff and agricultural nonpoint sources are primary contributors of use non-support and major impacts. It is also important to point out that natural sources have a major impact on water quality. Equally apparent, the primary pollutants causing use non-support are low dissolved oxygen from nutrient enrichment, pH problems associated with natural, low-flow, swamp waters and pathogen indicators. Finally, the waters affected by VDH fish consumption advisories for kepone in the lower James River and mercury in the South and North Fork Shenandoah River will not be included in the 303(d) impaired waters list for TMDL development. In the case of the kepone advisory, there is no loss of fish consumption designated use. Since fishing and the consumption of those fish caught are no longer restricted, these waters are considered fully supporting the fish consumption use. In the case of the mercury in the Shenandoah River, dredging these waters to remove the contaminants is considered more environmentally damaging than allowing the natural degradation process diminish any potential health impacts.

Finally, as stated in Chapter 2.6, it should be noted that the mileage/square miles/acres assessment results are different between the two methods presented in this report. The reason for this has to do with a change in the assessment guidance between the percent method and the binomial method. A decision was made not to assess a data set with only one sample when using the binomial assessment. This decision had an impact on lakes being sampled for the first time using the new “pilot” assessment program for lakes which DEQ has just initiated. Also, mileages for other special study stations with only one sample were affected when using the binomial assessment method.

TABLE 3.3 - 2-A **SUMMARY of ASSESSED WATERS**

PERCENT METHOD

Degree of Use Support	Type	Assessment Category		Total Assessed Size
		Evaluated	Monitored	
Size Fully Supporting All Assessed Uses	E	445.11	772.49	1,217.60
	R	40,218.23	4,087.56	44,305.79
	L	22,452.47	25,265.20	47,717.67
Size Fully Supporting All Assessed Uses but Threatened for at Least One Use	E	1.41	795.64	797.05
	R	0	636.29	636.29
	L	0	87,523.80	87,523.80
Size Not Fully Supporting for One or More Uses	E	57.43	421.55	478.98
	R	51.60	4,466.55	4,518.15
	L	0	3,880.00	3,880.00
Total Assessed	E	503.95	1,989.68	2,493.63
	R	40,269.83	9,190.41	49,460.23
	L	22,452.47	116,669.00	139,121.50

L = Lake - acres
E = Estuary - square miles
R = River - miles

TABLE 3.3 – 3- A **WATERBODY INDIVIDUAL USE SUPPORT SUMMARY TABLE**

PERCENT METHOD

Total Size Assessed:
Rivers – 49,460 miles
Lakes – 139,121.50 acres
Estuaries - 2,493.63 mi^2

Waterbody Size
Rivers - 49,460 miles
Lakes - 149,982 acres
Estuaries - 2,494 mi^2

Use	WaterBody Type	Size Fully Supporting	Size Fully Supporting but Threatened	TOTAL SIZE FULLY SUPPORTING	Size Partially Supporting	Size Not Supporting	TOTAL SIZE Not FULLY SUPPORTING	Size Assessed (Monitored and Evaluated)
Aquatic Life	River	9,404.51	1,153.25	**10,557.76**	928.70	1,072.78	**2,001.48**	12,559.24
	Lake	117,715.30	16,445.80	**134,161.10**	2,261.20	1,513.80	**3,775.00**	137,936.10
	Estuary	1,156.52	806.73	**1,963.25**	257.35	82.25	**339.60**	2,302.85
Fishing	River	48,967.76	124.22	**49,091.98**	280.70	80.40	**361.10**	49,453.08
	Lake	67,939.47	71,078.00	**139,017.47**	0	0	**0**	139,017.47
	Estuary	2,461.65	31.36	**2,492.36**	0	0	**0**	2,492.36
Shellfishing	River	*	*	**0**	*	*	**0**	0
	Lake	*	*	**0**	*	*	**0**	0
	Estuary	2,014.95	3.29	**2,018.24**	124.02	23.65	**147.67**	2,165.91
Swimming	River	5,368.33	4.68	**5,373.01**	1,836.65	1,226.76	**3,066.13**	8,436.42
	Lake	127,526.10	0	**127,526.10**	0	105.00	**105.00**	127,631.10
	Estuary	2,206.68	0	**2,206.68**	21.48	13.14	**34.62**	2,241.30
Drinking Water	River	5,795.19	0	**5,795.19**	2.15	0	**2.15**	5,797.34
	Lake	119,655.00	0	**119,655.00**	0	0	**0**	119,655.00
	Estuary	8.72	0.01	**8.73**	0	0	**0**	8.73

*Categories not assessed

TABLE 3.3 – 4-A SIZE OF WATERS NOT FULLY SUPPORTING BY VARIOUS CAUSE CATEGORIES IN VIRGINIA

PERCENT METHOD

Pollutant	Type	Total Not Fully Supporting
General Standards (Benthics)	River (mi) Lakes (acres) Estuary (mi^2)	635.52 0 239.15
Unionized Ammonia	River (mi) Lakes (acres) Estuary (mi^2)	1.25 0 1.70
Cause Unknown	River (mi) Lakes (acres) Estuary (mi^2)	62.05 0 0
Priority Organics (TBT)	River (mi) Lakes (acres) Estuary (mi^2)	0 0 13.20
PCB	River (mi) Lakes (acres) Estuary (mi^2)	182.59 0 3.00
Metals	River (mi) Lakes (acres) Estuary (mi^2)	189.15 0 3.60
PH	River (mi) Lakes (acres) Estuary (mi^2)	668.40 3,775.00 4.52
Siltation	River (mi) Lakes (acres) Estuary (mi^2)	8.50 0 0
Organic Enrichment/Low D.O.	River (mi) Lakes (acres) Estuary (mi^2)	988.12 0 140.69
Temperature	River (mi) Lakes (acres) Estuary (mi^2)	206.19 0 0
Pathogen Indicators	River (mi) Lakes (acres) Estuary (mi^2)	3,031.98 105.00 174.62
Habitat Alterations	River (mi) Lakes (acres) Estuary (mi^2)	15.11 0 0
Nitrate	River (mi) Lakes (acres) Estuary (mi^2)	2.15 0 0

TABLE 3.3– 5-A SIZE OF WATERS NOT FULLY SUPPORTING BY VARIOUS SOURCE CATEGORIES IN VIRGINIA

PERCENT METHOD

Source of Not Fully Supporting	Type	Total Not Fully Supporting
Industrial Point Sources	River (mi) Lakes (acres) Estuary (mi^2)	95.71 0 118.78
Municipal Point Sources	River (mi) Lakes (acres) Estuary (mi^2)	62.23 0 113.27
Combined Sewer Overflow	River (mi) Lakes (acres) Estuary (mi^2)	27.18 0 0
Collection System Failure	River (mi) Lakes (acres) Estuary (mi^2)	7.21 0 0
Agriculture	River (mi) Lakes (acres) Estuary (mi^2)	1,075.46 105.00 0
Construction	River (mi) Lakes (acres) Estuary (mi^2)	1.16 0 0
Stratification	River (mi) Lakes (acres) Estuary (mi^2)	0 0 18.05
Urban Runoff/Storm Sewers	River (mi) Lakes (acres) Estuary (mi^2)	718.56 105.00 14.44
Resource Extraction	River (mi) Lakes (acres) Estuary (mi^2)	140.95 0 0
Land Disposal	River (mi) Lakes (acres) Estuary (mi^2)	46.35 0 0
Hydromodification	River (mi) Lakes (acres) Estuary (mi^2)	18.27 0 0
Source Unknown	River (mi) Lakes (acres) Estuary (mi^2)	1,735.37 0 157.00
Habitat Modification	River (mi) Lakes (acres) Estuary (mi^2)	44.80 0 0
Natural Sources	River (mi) Lakes (acres) Estuary (mi^2)	1,054.72 3,775.00 119.48

Source of Not Fully Supporting	Type	Total Not Fully Supporting
VDH Shellfish Advisory	River (mi) Lakes (acres) Estuary (mi^2)	0 0 146.75
Commercial Port Authority	River (mi) Lakes (acres) Estuary (mi^2)	0 0 13.30
Other Point Source/Nonpoint	River (mi) Lakes (acres) Estuary (mi^2)	41.90 0 113.00
VDH Fish Consumption Advisory	River (mi) Lakes (acres) Estuary (mi^2)	361.10 0 0

TABLE 3.3 – 2-B SUMMARY of ASSESSED WATERS

BINOMIAL METHOD

Degree of Use Support	Type	Assessment Category		Total Assessed Size
		Evaluated	Monitored	
Size Fully Supporting All Assessed Uses	E	445.11	774.58	1,219.69
	R	40,207.42	4,183.68	44,391.10
	L	20,145.07	28,696.20	48,841.27
Size Fully Supporting All Assessed Uses but Threatened for at Least One Use	E	1.41	794.67	796.08
	R	1.00	1,220.52	1,221.52
	L	0	86,029.00	86,029.00
Size Not Fully Supporting for One or More Uses	E	57.43	419.78	477.21
	R	29.88	3,770.13	3800.01
	L	0	1,943.80	1,943.80
Total Assessed	E	503.95	1,989.03	2,492.98
	R	40,250.28	9,162.35	49,412.63
	L	20,145.07	116,669.00	136,814.10

L = Lake - acres
E = Estuary - square miles
R = River - miles

TABLE 3.3 - 3-B WATERBODY INDIVIDUAL USE SUPPORT SUMMARY TABLE

BINOMIAL METHOD

Total Size Assessed:
Rivers – 49,413 miles
Lakes – 139,323.50 acres
Estuaries - 2,493.63 mi^2

Waterbody Size
Rivers - 49,460 miles
Lakes - 149,982 acres
Estuaries - 2,494 mi^2

Use	WaterBody Type	Size Fully Supporting	Size Fully Supporting but Threatened	TOTAL SIZE FULLY SUPPORTING	Size Partially Supporting	Size Not Supporting	TOTAL SIZE Not FULLY SUPPORTING	Size Assessed (Monitored and Evaluated)
Aquatic Life	River	9,335.47	1,059.20	**10,394.67**	975.92	914.92	**1,890.84**	12,285.51
	Lake	91,931.37	14,951.00	**106,882.37**	450.00	1388.80	**1,788.80**	108,721.20
	Estuary	1201.75	805.89	**2007.64**	257.28	79.82	**337.10**	2,344.74
Fishing	River	48,904.38	140.00	**49,044.38**	280.70	80.40	**361.10**	49,405.48
	Lake	65,509.07	71,078.00	**136,587.07**	0	0	**0**	136,587.07
	Estuary	2,491.10	1.26	**2,492.36**	0	0	**0**	2,492.36
Shellfishing	River	*	*	**0**	*	*	**0**	0
	Lake	*	*	**0**	*	*	**0**	0
	Estuary	2,014.40	3.29	**2,017.69**	124.03	23.65	**147.68**	2,165.37
Swimming	River	5,336.90	824.89	**6,161.79**	1,325.10	940.44	**2,265.54**	8,427.33
	Lake	104,134.20	0	**104,134.20**	0	105.00	**105.00**	104,239.20
	Estuary	2,205.68	6.63	**2,212.31**	17.23	11.11	**28.34**	2,240.65
Drinking Water	River	5,795.19	0	**5,795.19**	2.15	0	**2.15**	5,797.34
	Lake	117,515.60	0	**117,515.60**	0	0	**0**	117,515.60
	Estuary	8.72	0.01	**8.73**	*	*	**0**	8.73

*Categories not assessed

TABLE 3.3 – 4-B SIZE OF WATERS NOT FULLY SUPPORTING BY VARIOUS CAUSE CATEGORIES IN VIRGINIA

BINOMIAL METHOD

Pollutant	Type	Total Not Fully Supporting
General Standards (Benthics)	River (mi) Lakes (acres) Estuary (mi^2)	634.92 0 239.15
Unionized Ammonia	River (mi) Lakes (acres) Estuary (mi^2)	1.25 0 1.70
Cause Unknown	River (mi) Lakes (acres) Estuary (mi^2)	62.05 0 0
Priority Organics (TBT)	River (mi) Lakes (acres) Estuary (mi^2)	0 0 13.20
PCB	River (mi) Lakes (acres) Estuary (mi^2)	182.59 0 3.00
Metals	River (mi) Lakes (acres) Estuary (mi^2)	178.51 0 3.60
PH	River (mi) Lakes (acres) Estuary (mi^2)	624.25 1,838.80 3.97
Siltation	River (mi) Lakes (acres) Estuary (mi^2)	8.50 0 0
Organic Enrichment/Low D.O.	River (mi) Lakes (acres) Estuary (mi^2)	946.58 0 138.59
Temperature	River (mi) Lakes (acres) Estuary (mi^2)	166.77 0 0
Pathogen Indicators	River (mi) Lakes (acres) Estuary (mi^2)	2,244.26 105.00 171.45
Habitat Alterations	River (mi) Lakes (acres) Estuary (mi^2)	15.11 0 0
Nitrate	River (mi) Lakes (acres) Estuary (mi^2)	2.15 0 0

TABLE 3.3– 5-B SIZE OF WATERS NOT FULLY SUPPORTING BY VARIOUS SOURCE CATEGORIES IN VIRGINIA

BINOMIAL METHOD

Source of Not Fully Supporting	Type	Total Not Fully Supporting
Industrial Point Sources	River (mi) Lakes (acres) Estuary (mi^2)	81.53 0 118.78
Municipal Point Sources	River (mi) Lakes (acres) Estuary (mi^2)	59.54 0 113.27
Combined Sewer Overflow	River (mi) Lakes (acres) Estuary (mi^2)	27.17 0 0
Collection System Failure	River (mi) Lakes (acres) Estuary (mi^2)	7.21 0 0
Agriculture	River (mi) Lakes (acres) Estuary (mi^2)	889.52 105.00* 0
Construction	River (mi) Lakes (acres) Estuary (mi^2)	1.16 0 0
Stratification	River (mi) Lakes (acres) Estuary (mi^2)	0 0 18.05
Urban Runoff/Storm Sewers	River (mi) Lakes (acres) Estuary (mi^2)	588.88 105.00* 13.65
Resource Extraction	River (mi) Lakes (acres) Estuary (mi^2)	140.95 0 0
Land Disposal	River (mi) Lakes (acres) Estuary (mi^2)	27.42 0 0
Hydromodification	River (mi) Lakes (acres) Estuary (mi^2)	18.27 0 0
Source Unknown	River (mi) Lakes (acres) Estuary (mi^2)	1,382.96 0 158.50
Habitat Modification	River (mi) Lakes (acres) Estuary (mi^2)	44.80 0 0
Natural Sources	River (mi) Lakes (acres) Estuary (mi^2)	975.82 1,838.80 118.35

Source of Not Fully Supporting	Type	Total Not Fully Supporting
VDH Shellfish Advisory	River (mi) Lakes (acres) Estuary (mi^2)	0 0 146.59
Commercial Port Authority	River (mi) Lakes (acres) Estuary (mi^2)	0 0 13.20
Other Point Source/Nonpoint	River (mi) Lakes (acres) Estuary (mi^2)	35.50 0 113.00
VDH Fish Consumption Advisory	River (mi) Lakes (acres) Estuary (mi^2)	361.10 0 0

* = two different sources for same not fully supporting water